

Name:

Solution Key

Without a calculator, evaluate each limit:

1. $\lim_{x \rightarrow 2} (x^2 + 3x - 1) = 2^2 + 3(2) - 1 = 4 + 6 - 1 = 9$

2. $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$

3. $\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$

4. $\lim_{t \rightarrow 3^+} \frac{2}{t-3} = \infty$

5. $\lim_{k \rightarrow 0} \frac{|k|}{k} = \text{undefined}$

$$6. \lim_{y \rightarrow 2} \frac{y^2 - 3y + 2}{y^2 - 4} = \lim_{y \rightarrow 2} \frac{(y-1)(y-2)}{(y-2)(y+2)} = \lim_{y \rightarrow 2} \frac{y-1}{y+2} = \frac{1}{4}$$

$$7. \lim_{t \rightarrow \infty} \frac{6t^2 + 5t}{2t^2 + 8} = \frac{6}{2} = 3$$

$$8. \lim_{t \rightarrow \infty} \frac{5t-3}{t^2-9} = 0$$

$$9. \lim_{t \rightarrow \infty} \frac{6t^3 + 5t^2}{2t^2 - t} = \infty$$

$$10. \text{ Given } f(t) = \begin{cases} 2t+4 & \text{if } t \leq -1 \\ -3t-2 & \text{if } t > -1 \end{cases}, \lim_{t \rightarrow -1^+} f(t) = (-3(-1)-2) = 1$$

11. Given $f(t) = \begin{cases} 2t+4 & \text{if } t \leq -1 \\ -3t-2 & \text{if } t > -1 \end{cases}$, $\lim_{t \rightarrow -1} f(t) = \text{undefined}$

$$2(-1) + 4 = 2$$

$$-3(-1) - 2 = 1$$

12. Given $g(x) = \begin{cases} 5-x & \text{if } x < 2 \\ \frac{1}{2}x+2 & \text{if } x \geq 2 \end{cases}$, $\lim_{x \rightarrow 2} g(x) = 3$

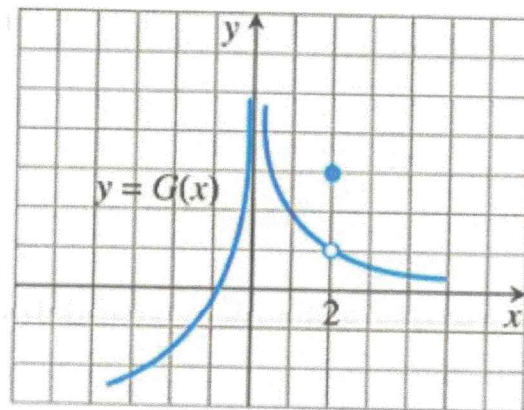
$$5 - 2 = 3$$

$$\frac{1}{2}(2) + 2 = 1 + 2 = 3$$

13. Given the graph of $y = G(x)$, determine each of the following:

a. $G(2) = 3$

b. $\lim_{x \rightarrow 2} G(x) = 1$



OPTIONAL EXTRA CREDIT

Evaluate $\lim_{x \rightarrow 3} \frac{x-3}{x^3-27} = \lim_{x \rightarrow 3} \frac{x-3}{(x-3)(x^2+3x+9)} = \lim_{x \rightarrow 3} \frac{1}{x^2+3x+9}$

$$= \frac{1}{9+9+9}$$

$$= \frac{1}{27}$$